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QR CODE BASED SECURITY SYSTEM TO PREVENT UNAUTHORIZED ACCESS

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***Abstract*— In urban areas one of the main reasons for theft is due to unauthorized people who come as plumbers, carpenters, electricians and rob the house. Among the various criminal activity cases it can be seen that and maximum cases are house break in. So this system efficiently tackles the problem. The system consists of a camera and PIR sensor which is placed at the balcony of house, which is used to detect an intruder, and a mobile application which will send real time QR code to a Wi-Fi module and a guest.**

***Index Terms*—PIR sensor, Wi-Fi module, Microcontroller, Encryption, Database, QR code, Decryption.**

I. INTRODUCTION

QR code (abbreviated from Quick Response Code) is the trademark for a type of matrix barcode (or two- dimensional barcode) first designed for the automotive industry in Japan. A QR code uses four standardized encoding modes (numeric, alphanumeric, byte / binary, and kanji) to efficiently store data; extensions may also be used. A QR code consists of black modules (square dots) arranged in a square grid on a white background, which can be read by an imaging device (such as a camera) and processed using Reed–Solomon error correction until the image can be appropriately interpreted. The required data are then extracted from patterns present in both horizontal and vertical components of the image.

II. ENCRYPTION OF QR CODE

Encryption changes data or information that is normally plain text through the usage of an algorithm so that someone must possess certain knowledge to access it. This special knowledge is normally called a key. Encrypted QR codes are QR codes that not everyone can scan and access, so there should be a similar key used for decryption of QR code.

III. DESIGN OF QR CODE

Unlike the older, one-dimensional barcodes that were designed to be mechanically scanned by a narrow beam of light, a QR code is detected by a 2-dimensional digital image sensor and then digitally analyzed by a programmed processor. The processor locates the three distinctive squares at the corners of the QR code image, using a smaller square (or multiple squares) near the fourth corner to normalize the image for size, orientation, and angle of viewing. The small dots throughout the QR code are then converted to binary numbers and validated with an error-correcting code.

IV. INFORMATION CAPACITY AND VERSION OF QR CODE

The symbol versions of QR Code range from Version 1 to Version 40. Each version has a different module configuration or number of modules. (The module refers to the black and white dots that makeup QR Code.) "Module configuration" refers to the number of modules contained in a symbol, commencing with Version 1 (21 × 21 modules) up to Version 40 (177 × 177 modules). Each higher version number comprises 4 additional modules per side. Each QR Code symbol version has the maximum data capacity according to the amount of data, character type and error correction level. In other words, as the amount of data increases, more modules are required to comprise QR Code, resulting in larger QR Code symbols. Figure 1 describes the maximum storage capacity of QR code.

Maximum character storage capacity (40-L)

character refers to individual values of the input mode/datatype

Input mode	max. characters	bits/char	possible characters, default encoding
Numeric only	7,089	3⅓	0, 1, 2, 3, 4, 5, 6, 7, 8, 9
Alphanumeric	4,296	5½	0–9, A–Z (upper-case only), space, $, %, *, +, -, ., /, :
Binary/byte	2,953	8	ISO 8859-1
Kanji/kana	1,817	13	Shift JIS X 0208

Fig.1

V. QR CODE VS BAR CODE

QR code is considered better compared to bar code as QR code possess these features:

High Density – characters QR Code can contain up to 1852 VIII

Very Fast Decoding - It takes a second or two to decode the Information from the encrypted in the QR Code. About 5- 6KB of Information is transferred online to the server and it responds very faster as compared to the General Barcode.

QR code can also contain images in them which serves very useful in many application and also looks fancier.

VI. POWER EFFICIENT SYSTEM

In order to create a power efficient system, the camera need not be on all the time. The camera needs to be on only when an intruder arrives. So there needs to be a motion

sensor which will sense the entry of person. This is done using a PIR sensor.

VII. PASSIVE INFRARED SENSOR PRINCIPLE

Every object that has a temperature above perfect zero emits thermal energy (heat) in form of radiation. We, Humans radiate at wavelength of 9-10micrometers all time of the day.

The PIR sensor itself has two slots in it, each slot is made of a special material that is sensitive to IR. Two slots can 'see' out past some distance (basically the sensitivity of the sensor). When the sensor is idle, both slots detect the same amount of IR, the ambient amount radiated from the room or walls or outdoors. When a warm body like a human or animal passes by, it first intercepts one half of the PIR sensor, which causes a positive differential change between the two halves. When the warm body leaves the sensing area, the reverse happens, whereby the sensor generates a negative differential change. These change pulses are what is detected. The output voltage is therefore varied and thus the motion can be sensed. The PIR sensor has a wide range as shown in figure 2.

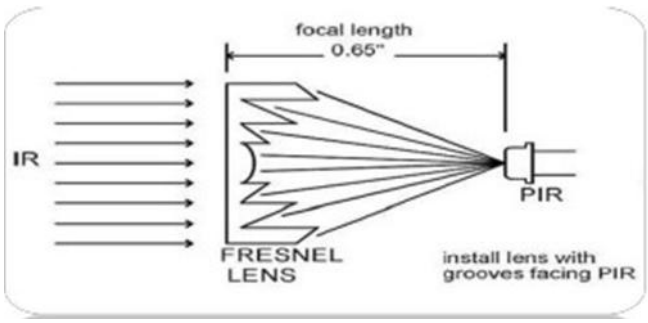

Fig 2

VIII. THE SYSTEM

The house owner (who has gone to office) will generate a QR code from his mobile application and send it via internet if he wants to give access to the person who is trying to enter his house. The QR code generated will be sent to the specific person and the Wi-Fi module. The system consists of a Camera which is connected to internet via a Wi- Fi module (with microcontroller)

IX ANDROID APP

There is a mobile application which will be present in the user's mobile which can send the QR code to the concern person through any means such as whatsapp or facebook or mail. The person can take this QR code and show it to the camera to get access to the house. Figure 3, 4, 5, 6 shows the various pictures of app.

Fig 3.

Fig 4.

Fig 5.

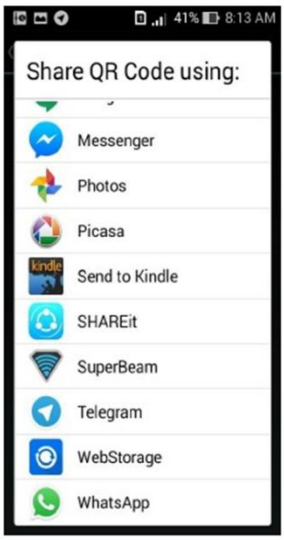

Fig 6.

X. CAMERA FOR QR CODE DETECTION

There is a camera in the balcony of the house which will be turn on based on value of PIR sensor It waits for the QR code input to be shown by the intruder Image captured by camera contains unwanted noises. Image processing techniques are implemented. Processed image is then fed to QR code decode operator. Decoded message is compared with original message sent by user for authentication. This block diagram in figure 7 represents the QR code detection system.

XI. WIFI MODULE

The Wi-Fi module will be connected to the internet by simply connecting it to a Wi-Fi router or a Wi-Fi hotspot. So the module can be controlled from any corner of the world.

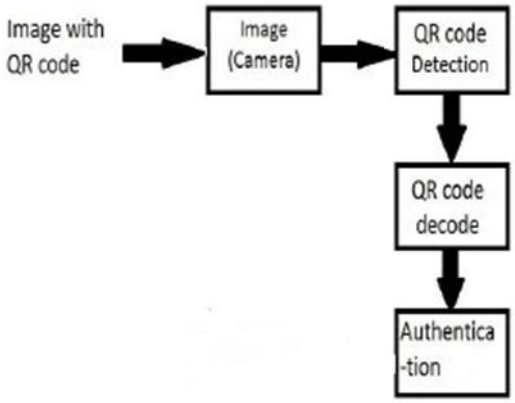

Fig 7.

This Wi-Fi module (can be CC3100 or ESP8266) can be connected to a microcontroller (msp430 or arduino) or can contain an embedded controller (can be CC3200) in it to control other devices connected to it. The protocol which the Wi-Fi module uses to connect to internet is MQTT. MQTT is a machine to machine (M2M)/"Internet of Things" connectivity protocol. It was designed as an extremely lightweight publish/subscribe messaging transport. It is useful for connections with remote locations where a small code footprint is required. With MQTT, there are 3 main components:

PUBLISHER: The Wi-Fi module will be the publisher, as it will be publishing sensor data under a specific ―Topic.

BROKER: This is the ―middle man who holds on to the data that is being published. There are many publically brokers like eclipse, mosquito.

SUBSCRIBER: In order to subscribe to any data that is being sent by a PUBLISHER, the SUBSCRIBER must be connected to the same BROKER & subscribed to the same topic as the PUBLISHER. As long as these 2 conditions are met, the SUBSCRIBER will be able to receive messages from the PUBLISHER.

XII. THE DATABASE

There is a database created in which will store the real time values given by the owner.

A choreo which will include functionality for executing individual SQL commands and performing bulk database operations for MySQL. Figure 7 shows the URL of the created website from which data will be appended to the database. The URL can be accessed by phone from which user can directly put the realtime data into database. Figure 7 shows the database created in phpmysql.

URL of site where database will be updated by owner: Fig 7 http://phpoarelations.rhcloud.com/test.php

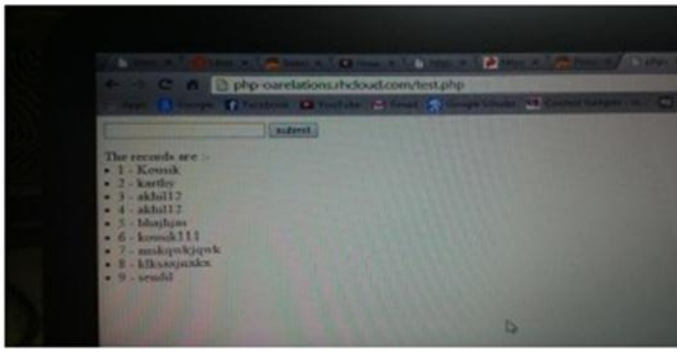

Fig 8

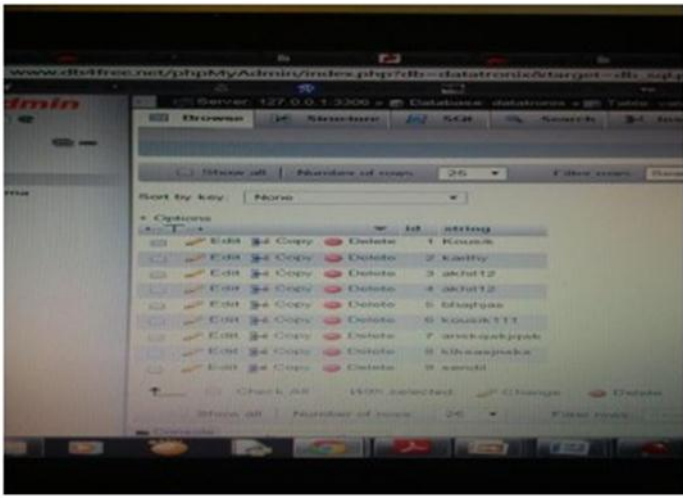

Fig 9

XIII. SECURITY SYSTEM

The string which the owner entered can therefore be retrieved. This string is compared with the string which has been de-coded by the camera. If both are same then access is granted for the intruder. If the decoded QR code doesn't match the string sent then the intruder is given two more chances. If both the time different QR code is scanned then there is a alert message saying the intruder that its his last chance to scan the code. If still the intruder is trying to flash different QR code then there will be automatically the front door will be locked and pictures taken automatically of the intruder. The photos of intruder will be automatically taken by camera and sent to owner. The owner can call the police station that there is an intruder has come to his house and necessary actions can be taken.

XIV. CONCLUSION

Therefore this can system can improve the safety systems in urban areas. This technology enables the design of low-power, small-sized, and low-cost system which can be embedded with a wide range of future products which will eventually lead towards innovation. So security systems can be done more efficiently.

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REFERENCES

[1] https://learn.adafruit.com/pir-passive-infrared-proximity-motion-sensor/how-pirs-work
[2] http://www.qrcode.com/en/about/version.html
[3] http://www.qrcodestickers.org/qr-code-articles/encrypted qr-codes.html
[4] http://www.ti.com
[5] https://www.temboo.com
[6] http://www.db4free.net/